DESCRIPTION

Figure 1 is a horizontal cross section of a pump and adapted to be operated in accordance with my invention.

In this drawing the device contains runners/rotors (Fig.3) composed of several flat rigid disks of a suitable diameter, each disk being open in the center and held in position by the requisite number and length of rods/bolts separated by spacers for desired separation to the end disks/plates which are spoked and held in position on the drive shaft by the use of keyways and keys and secured using requisite set screws, the length of these runners/rotors can be changed to the most efficient length depending on the number of stages as required to achieve the ultimate desired base pressure, as illustrated in (fig. 1). The runners/rotors are operated in a stage housing (Fig. 3), which are attached to either stage transition plates or the exhaust or intake plates (Fig. 1). The drive shaft has bearings at each stage transition plate as well as at the exhaust and intake plates, and is connected to the drive motor using an appropriate coupling. The end plate designs vary based on either input or exhaust (Fig. 1). The Stage transition plates (Fig. 3) are designed to be universal as to accommodate assembly of pumps with as many stages as desired depending on a predetermined operating vacuum level. The motor is attached to one of the end plates by the use of a cushioned motor coupling and held to the pump using a special flange containing an opening to allow for proper spacing and adjustment. The motor (Fig. 1) can be run as a stand alone or driven by use of a frequency converter as to be able to control the speed, performance,

and pressure. All or any of the elements of this pump can be either coated with various things such as Teflon, or manufactured from a variety of materials such as composites or metals dependent upon the required need for the resistance of corrosion.

OPERATION

An understanding of the principle embodied in this device will be gained from the following description of its mode of operation. Power being applied to the shaft and the runner/rotor set in rotation in the direction of the solid arrow/arrows (Fig. 1), the fluid by reason of its properties of adherence and viscosity, upon entering through the inlets or ports and coming in contact with the disks is taken hold of by the same and subjected to two forces, one acting tangentially in the direction of rotation, and the other radialy outward. The combined effect of these tangential and centrifugal forces is to propel the fluid with continuously increasing velocity in a spiral path until it reaches the outlet or exhaust from which it is ejected. This spiral movement, free and undisturbed and essentially dependent on the properties of the fluid, permitting it to adjust itself to natural paths or stream lines and to change its velocity and direction by insensible degrees, is characteristic of this method of propulsion and advantageous in its application. While traversing the chamber enclosing the runner/rotor, the particles of the fluid may complete one or more turns, or but a part of one turn. In any given case their path can be closely calculated and graphically represented, but fairly accurate estimate of turns can be obtained simply by defining the number of revolutions required to renew the fluid

Passing through the chamber and multiplying it by the ratio between the mean speed of the fluid and that of the disks. The quantity of fluid propelled in this manner is, other conditions being equal, approximately proportionate to the active surface of the runner/rotor and to its effective

speed. For this reason, the performance of such machines augments at an exceedingly high rate with the increase of their size and speed of revolution.

The dimensions of the device as a whole and the spacing of the disks in any given machine will be determined by the conditions and requirements of each individual project. It may also be stated that the intervening distances should be greater, the larger the diameter of the disks, the longer the spiral path of the fluid and the greater its viscosity. In general the spacing should be such that the entire mass of the fluid, before leaving the runner/rotor, is accelerated to a nearly uniform velocity, not much below that of the periphery of the disks under normal working conditions and almost equal to it when the outlet/exhaust is closed and the particles move in concentric circles.

Another application of this principle and the utilization of machines such as above described for the compression or rarefaction of air or gases in general. In such cases it will be found that most of the general considerations obtain in the case of liquids, properly interpreted hold true.

SUMMERIZATION

The principles underlying this invention are also applicable for use in the field of mechanical engineering concerned in the use of fluids as motive agents, for while in some respects the actions in the latter case are directly opposite to those met with in the propulsion of fluids, the fundamental laws applicable in the two cases are the same. In other words, the operation above described is reversible, for if water or air under pressure be admitted to the opening the runner/rotor is set in rotation in the direction of the dotted arrow by reason of the peculiar properties of the fluid which traveling in a spiral path and with continuously diminishing velocity, reaches the orifices and through which it is discharged.

The principles of construction and operation described apply in a wide variety of machines of different forms, and are adaptable to a great variety of application. I have sought to describe and explain only the general and typical applications of the principles applying to these specific industries, which I believe I am the first to realize and employ.

A machine for propelling or imparting energy to fluids or gases, comprising in combination an enclosed housing, end plates with ports of inlet and outlet, center plates, and a runner/rotor or runners/rotors mounted within the casing and composed of spaced disks with plane surfaces having opening adjacent to the axis of rotation.

A rotary pump, comprising in combination a plurality of spaced disks with plane surfaces mounted on a relatable shaft and provided with openings adjacent thereto, an outer casing with end and center plates enclosing the said disks, means for admitting a fluid into that portion of the enclosure which contains the shaft and an outlet extending tangentially from the peripheral portion of said enclosure.

A BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a cross section view of the pump illustrating how the stages are assembled including the end that the drive shaft connects to the motor. As shown the rotor assemblies attach to either transition plates or end plates depending on how many stages the pump consists of. The fluid/gas flow travels through the inlet port through the rotor and then transferred to the next stage through the transition plate stage by stage until it is expelled out the exhaust. The motor is connected to the drive shaft by use of a damped coupling.

Fig. 2 is an expanded cross section view of a typical rotor assembly section showing the end plates containing the labyrinth seals, the disks and spacing between the disks.

Fig. 3 is an expanded cross section view of a single stage showing the rotor assembly section contained within the outer housing, the drive shaft and the transition plates.